Analysis of the Effect of the Comprehensive Nursing Model on Patients with Moyamoya Disease Undergoing Intracranial and Extracranial Revascularization Surgery

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Abstract: *Objective*: To explore the effect of a comprehensive nursing model on patients with Moyamoya disease who underwent intracranial and extracranial revascularization surgery. *Methods*: 110 cases were divided into control and observation groups with 55 cases each. The control group received routine perioperative care, and the observation group received perioperative care along with comprehensive nursing care. The two groups' disease cognition levels, anxiety, symptoms, daily living ability scores, and postoperative complication rates were compared. *Results*: The anxiety score and total postoperative complications of the observation group upon discharge were lower than that of the control group, and the disease cognition level and daily living ability upon discharge were higher than that of the control group ($P < 0.05$). *Conclusion*: Applying the comprehensive nursing model in conjunction with perioperative care for patients undergoing surgery can effectively improve their anxiety, strengthen activities of daily living, and reduce the risk of postoperative complications.

Keywords: Comprehensive nursing model; Moyamoya disease; Intracranial and extracranial revascularization surgery; Application effect

1. Introduction

Moyamoya disease is a rare progressive cerebrovascular disease. The disease begins at the ends of the bilateral internal carotid arteries and the start of the anterior and middle cerebral arteries. Depending on progressive stenosis or occlusion, the base of the skull may subsequently form a network of abnormal blood vessels., The blood vessel network will resemble a smoke-like pattern in cerebral angiography, hence the name [1]. Since the blood vessels affected by Moyamoya disease are all critically perforated, they can cause varying degrees of functional damage in different areas of the brain, resulting in cognitive dysfunction, movement disorders, etc. Intracranial and extracranial revascularization surgery are essential means of treating Moyamoya

disease. This procedure increases extracranial blood flow into the brain through blood flow reconstruction, thereby maintaining normal blood supply to the brain tissue. However, high-quality nursing care is required during treatment to improve patient recovery. Comprehensive nursing is a new nursing model widely used in clinical practice in recent years. This method differs from conventional nursing and focuses more on symptom improvement. Comprehensive nursing in cognitive, psychological, and other modules can be further strengthened to improve the physical and mental state of patients during rehabilitation. This article explores the clinical benefits of applying the comprehensive nursing model along with routine perioperative care in 110 cases of Moyamoya disease patients who underwent intracranial and extracranial revascularization surgery.

2. Materials and methods

2.1. Materials

110 cases of patients with Moyamoya disease were enrolled, all admitted from January 2022 to December 2023. The patients were divided into a control group and an observation group according to their time of admission, with 55 cases/group. The control group consisted of 22 males and 33 females, with ages ranging from 32–75 years old, with an average age of 53.53 ± 9.25 years. There were 25 males and 30 females in the observation group with ages ranging from 34–76 years old, with an average age of 54.92 ± 9.65 years. There were no differences ($P > 0.05$) in the baseline data of both groups. Inclusion criteria: (1) Diagnosed with Moyamoya disease based on the standards of Moyamoya Disease Guidelines [2] and the diagnosis was confirmed through cerebral angiography; (2) qualified for intracranial and extracranial revascularization surgery; (4) complete medical records; (6) conscious, able to communicate normally, and had no history of mental, cognitive, or psychological diseases; (6) consented to the study. d. Exclusion criteria: (1) history of alcoholism, drug abuse, mental disorders, etc.; (2)contraindications towards the surgical treatment; (3) presence of serious physical and organic diseases; (4) extremely low compliance; (5) or dropped out of the study midway.

2.2. Methods

Routine perioperative care was carried out for the control group before surgery. The patient was informed about all relevant knowledge, and preparations for surgery were made. During surgery, physical signs were closely monitored and any abnormal conditions were reported. After surgery, the patient's condition was continuously monitored and relevant drugs were administered rationally. The patient was instructed to follow a specific diet plan and perform rehabilitation exercises. Upon discharge, the patient was informed about the relevant precautions and was required to return regularly for follow-up visits.

Routine perioperative care was carried out for the observation group, in conjunction with the comprehensive nursing model. The specific contents of the model include three types of care. (1) Health education: Health education was provided for individuals according to their age and education, and they were informed about the surgery process, precautions, and other information. All queries and doubts were addressed and any misunderstandings were righted. After surgery, common complications and their countermeasures were addressed to enable the establishment of correct cognitive concepts and encourage patient cooperation; (2) Psychological care: Before surgery, the significance of the surgery and past successful cases were explained to the patient's family members. Any doubts and worries were handled in a friendly manner. The patients were also informed of the surgical results immediately post-surgery. The patient was monitored closely for emotional changes and individualized psychological counseling was implemented in a timely manner. Extra measures were taken when necessary. There were five aspects of basic care in the comprehensive nursing model. (1) Medication. Before administration, the individual's past medical history,

treatment history, allergy history, etc. was clarified. After administration, strict supervision was carried out to ensure the patient complied with the medical requirements and any adverse reactions were dealt with. (3) Diet: A personalized diet plan was developed based on the individual's condition and dietary preferences to prevent and treat constipation. Standardized enteral nutrition support was also provided to patients with dysphagia. (3) Prevention of complications: Postoperative abnormalities such as headache, restlessness, visual or cognitive impairment, epileptic seizures, fluctuations in blood pressure, etc. were closely monitored. If present, the presence of postoperative cerebral hyperperfusion syndrome (CHS) was considered. Antihypertensive and sedative drugs were administered to patients with a history of epilepsy. In the event of an epileptic seizure, oxygen was administered to the patient in time to ensure a smooth respiratory tract. Anti-epileptic drugs were also administered accordingly. The onset time of the seizure was recorded, and the individual was closely observed for any abnormalities in consciousness, physical changes, and movement of the limbs. For patients who developed transient speech impairment 2-3 days after surgery, brain magnetic resonance imaging (MRI) was performed to prevent acute cerebral infarction. If present, a doctor was consulted immediately. Medication was administered and emergency decompression surgery was implemented when necessary. (4) Rehabilitation training: A targeted rehabilitation training program was developed based on the individual's condition and training was immediately stopped when discomfort occurred. (5) Follow-up: A health manual was issued upon discharge and the patient was instructed to return for regular check-ups. Changes in the patient's condition were monitored and medical advice was sought immediately if any abnormalities were found. A WeChat group was also established with the patient's consent where health information and online consultation services were provided.

2.3. Observation indicators

The self-made Disease Cognition Level Questionnaire was issued to the patients before and upon discharge and the patient's Self-Rating Anxiety Scale (SAS), and Daily Living Activities Scale (ADL) scores were measured. The score of the questionnaire ranged from 0–100 points, whereby the score positively correlated with the patient's disease cognitive level. The presence of anxiety was defined by a SAS score of 50 points. An increasing SAS score indicated an increased severity of anxiety. The ADL score ranged from 0–100 points, which corresponded to the level of daily living abilities. The incidence of postoperative complications between the two groups was observed and compared.

2.4. Statistics

Based on SPSS 25.0 for Windows software, the observed data were compared normatively. The measurement data were expressed as mean ± standard deviation and were compared using the t-test; the count data were expressed as percentages and compared using the chi-square (χ^2) test; $P < 0.05$ indicates a statistically significant difference.

3. Results

3.1. Comparison of disease cognition level, anxiety, and daily living ability scores between the two groups

As shown in **Table 1**, there were no significant differences in the disease cognitive level, anxiety, and daily living abilities between the two groups ($P > 0.05$); upon discharge, the SAS score and disease cognition level of the observation group were lower than that of the control group. The ADL score was higher than that of the control group at $P < 0.05$.

Table 1. Comparison of disease cognitive level, SAS, and ADL score results (mean ± standard deviation, scores)

Group	Number of cases (*n*)	Disease awareness level		SAS		ADL	
		Before care	Upon discharge	Before care	Upon discharge	Before care	Upon discharge
Control group	*n*= 55	60.39 ± 7.54	74.56 ± 8.62	67.23 ± 8.44	56.28 ± 6.58	60.52 ± 8.01	71.12 ± 9.34
Observation group	*n*= 55	60.51 ± 7.62	88.98 ± 9.87	67.19 ± 8.37	48.52 ± 5.21	60.44 ± 7.98	84.12 ± 10.05
t	-	0.083	8.161	0.025	6.857	0.052	7.027
P	-	0.934	0.001	0.980	0.001	0.958	0.001

3.2. Comparison of postoperative complication rates between the two groups

The total value of postoperative complications is illustrated in **Table 2**. Incidences of postoperative complications in the observation group were lower than that of the control group at *P* < 0.05.

Table 2. Comparison of total postoperative complications (*n* [%])

Group	Number of cases (*n*)	Epilepsy	Acute cerebral infarction	CIS	Others	Total
Control group	*n*= 55	2 (3.64)	3 (5.45)	2 (3.64)	4 (7.27)	11 (20.00)
Observation group	*n*= 55	1 (1.82)	1 (1.82)	0 (0.00)	1 (1.82)	3 (5.45)
χ^2	-	-	-	-	-	5.238
P	-	-	-	-	-	0.022

4. Discussion

Research has shown that blood vessels dilating in a smoke-like manner represent intracranial perforating arteries, which play a role in compensatory collateral circulation in the brain [3]. The clinical symptoms observed after lesions are also relatively diverse and complex with the more common ones including cerebral ischemia, cerebral hemorrhage, epilepsy, cognitive dysfunction, etc. The specific cause and pathogenesis of the Moyamoya disease have not been thoroughly studied hence its treatment methods are still in the exploratory stage. There are also no effective medications available for this disease. However, it has been found that intracranial and extracranial revascularization surgery is effective in improving the condition of patients with cerebral ischemia. Currently, this surgery has been regarded as a highly important intervention method for Moyamoya disease. However, the complexity of the surgery and its invasive nature, as well as the high postoperative complication rate, individual cognitive differences, and negative emotions, may affect its clinical efficacy. Hence, it is necessary to actively implement a comprehensive and high-quality nursing model during the perioperative period to improve patient prognosis [4].

In the past, perioperative care was often chosen during clinical extracranial and intracranial revascularization surgeries. It is a disease-centered nursing model that focuses more on ensuring the smooth progress and completion of the surgery and improving the patient's postoperative condition. Although effective rehabilitation can improve the patient's symptoms to a certain extent, the overall quality of care is not ideal. This nursing intervention is relatively one-sided and passive as it only focuses on observable conditions. However, it does not address the cognitive and psychological needs of different individuals, making it difficult to increase patients' compliance[5]. According to **Table 1** and **Table 2**, the observation group had lower SAS scores upon discharge, higher disease cognitive levels, and ADL scores as compared to that of the control group. In the observation group, only 5.45% of the patients had postoperative complications. This result suggests that

comprehensive care resulted in fewer postoperative complications and was more effective in improving the patient's condition.

Comprehensive nursing is a high-quality nursing model developed based on the idea of l "patient-centered" nursing. Although comprehensive nursing is more time-consuming than conventional nursing, it can address the characteristics and needs of different patients. Comprehensive nursing enables maximum care with limited medical resources, resulting in better patient satisfaction at physical, psychological, and spiritual levels [6]. As shown in the observation group, implementing a series of basic nursing care such as medication, diet, complication prevention, and rehabilitation training positively facilitated the overall recovery of the patient. On the other hand, targeted nursing intervention positively affects the cognitive and psychological state of patients by allowing for a better understanding of the disease, improvement of patient compliance, and promoting patient recovery. Along with the WeChat follow-up upon discharge, these high-quality nursing services in the hospital are well received and also aid in improving patient compliance.

5. Conclusion

The implementation of a comprehensive nursing model for Moyamoya disease patients undergoing intracranial and intracranial revascularization surgery can further reduce their anxiety, improve the quality of prognosis, and reduce postoperative complications. It should be popularized.

Disclosure statement

The author declares no conflict of interest.

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